Meridian 1

Meridian Data Services

Description

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April 2000

Standard 5.00. This is a global document and is up-issued for X11 Release 25.0x. Document changes include removal of: redundant content; references to equipment types except Options 11C, 51C, 61C, and 81C; and references to previous software releases.

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General information

Meridian 1 data features are optional packages that are compatible with X11 software. They provide integrated voice and data calls.

References

For complete details concerning specific Meridian data features, refer to the following documents:

- *Meridian Communications Adapter: M3902, M3903, M3904 User Guide*
- *Meridian 1 Telephones: Description and Specifications* (553-3001-108)
- *Meridian Programmable Data Adapter User Guide*
- *X11 Features and Services* (553-3001-306)
- *NT7D16 Data Access Card: Description and Operation* (553-3001-191)
- *Multi-Purpose Serial Data Link: Description* (553-3001-195)
- *Meridian Data Features: Traffic Engineering and Configuration* (553-2731-151)
- *Meridian Data Features: Operations and Tests* (553-2731-300)
- *X11 Administration* (553-3001-311)
- *ISDN Basic Rate Interface: Product Description* (553-3901-100)
- *ISDN Basic Rate Interface: Installation* (553-3901-200)
- *ISDN Basic Rate Interface: Administration* (553-3901-300)
- *ISDN Basic Rate Interface: Acceptance Testing* (553-3901-330)
- *ISDN Basic Rate Interface: Maintenance* (553-3901-500)

Introduction

Content list

The following are the topics in this section:

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Basic data call configuration

The Meridian Data Services features support a wide range of dial-up data communication activities. These applications fall into different basic categories based on equipment configuration. These categories are designated as follows:

- Local Terminal to Terminal activities involve in-house communication between intelligent terminals, display terminals, and data entry devices. Word processor communication and conversational information exchange fall into this category (Figure 1).
- Terminal to Terminal Computer Port configurations support applications such as distributed data processing, time-shared computing, and inquiry/response (Figure 2).
- Terminal to Remote Device applications involve the use of a modem pool to access analog lines for external data communications. The Meridian 1 permits external data calling on facilities also used for voice communications, such as WATS, FX and TIE lines (Figure 3).

- Remote Terminal to Local Device applications involve the use of an inbound modem pool for incoming calls to access local devices (terminals or computer ports). The Meridian 1 permits incoming data calling on facilities also used for voice communications, such as WATS, FX and TIE lines. (Figure 4).

  Note: Remote Peripheral Equipment (RPE) may also be used for remote terminals to local device operation. The various data applications and hardware that may be connected to the Meridian 1 are shown in Figure 5.

The modem pool configuration provides internal data stations access to shared dial-up modems for outgoing trunk calls or remote terminals access to local computer ports over a voice grade network. An Add-on Data Module (ADM) connected to the modem provides the Data Directory Number (DDN) required for the receipt of incoming calls to the pooled modem.

Automated Modem Pooling

Meridian 1 offices that use X11 release 5 provide the database to accommodate ADM Trunk Group and the optional Automated Modem Pooling (AMP) features. These features allow access to local or remote data stations using ADM/Modem pairs with a single-step dialing procedure and eliminate the need for separate inbound and outbound pools. AMP uses the Dataport Hunting feature to select the appropriate data set or dataport.

Figure 1
Terminal to Terminal Data Call configuration

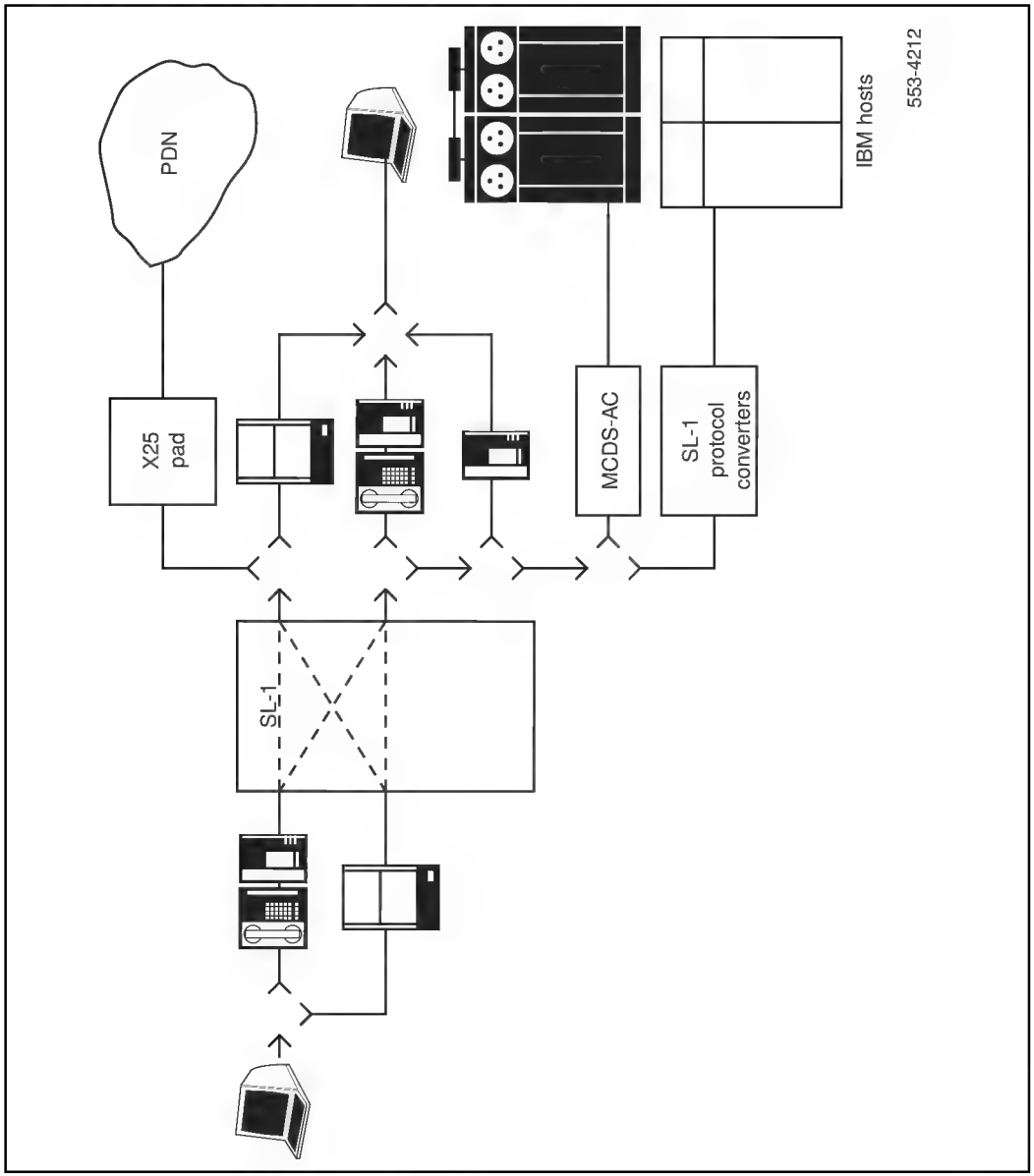


Figure 2
Terminal to Terminal Computer Port Data Call configuration

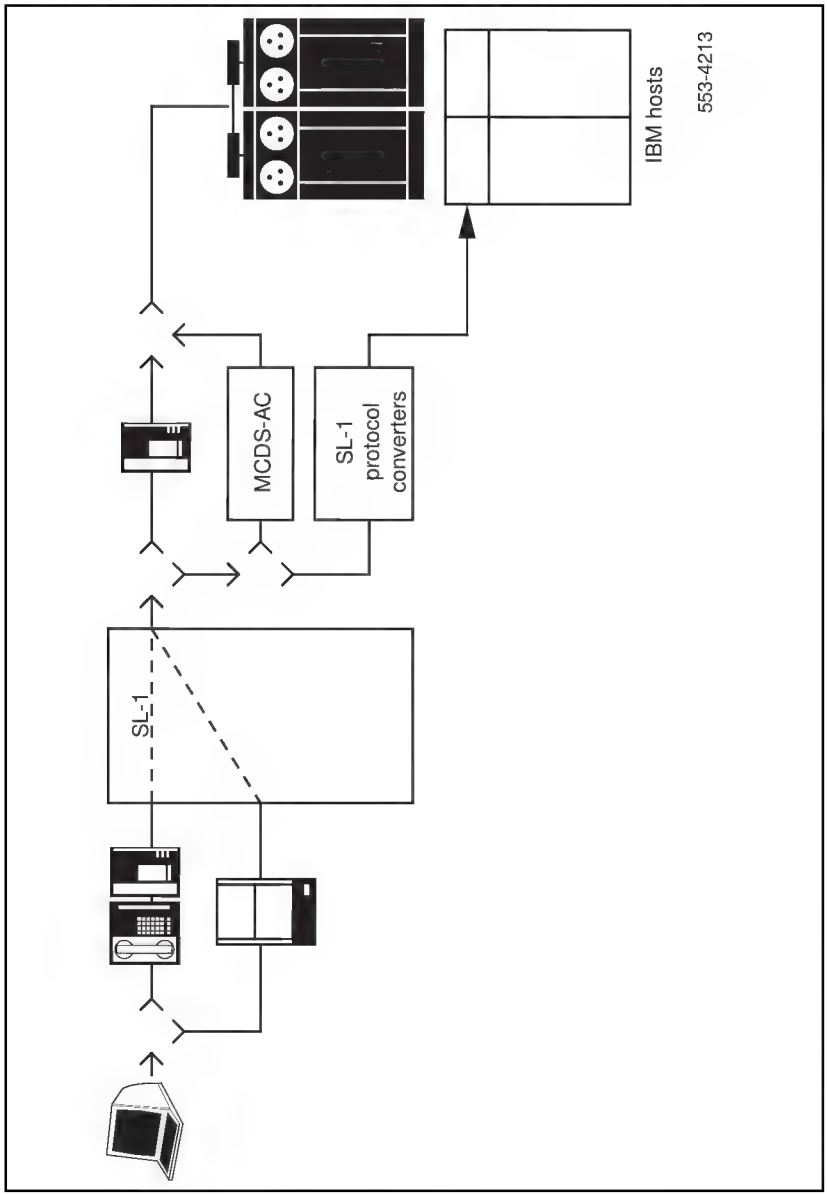


Figure 3
Terminal to Remote Device Data Call configuration

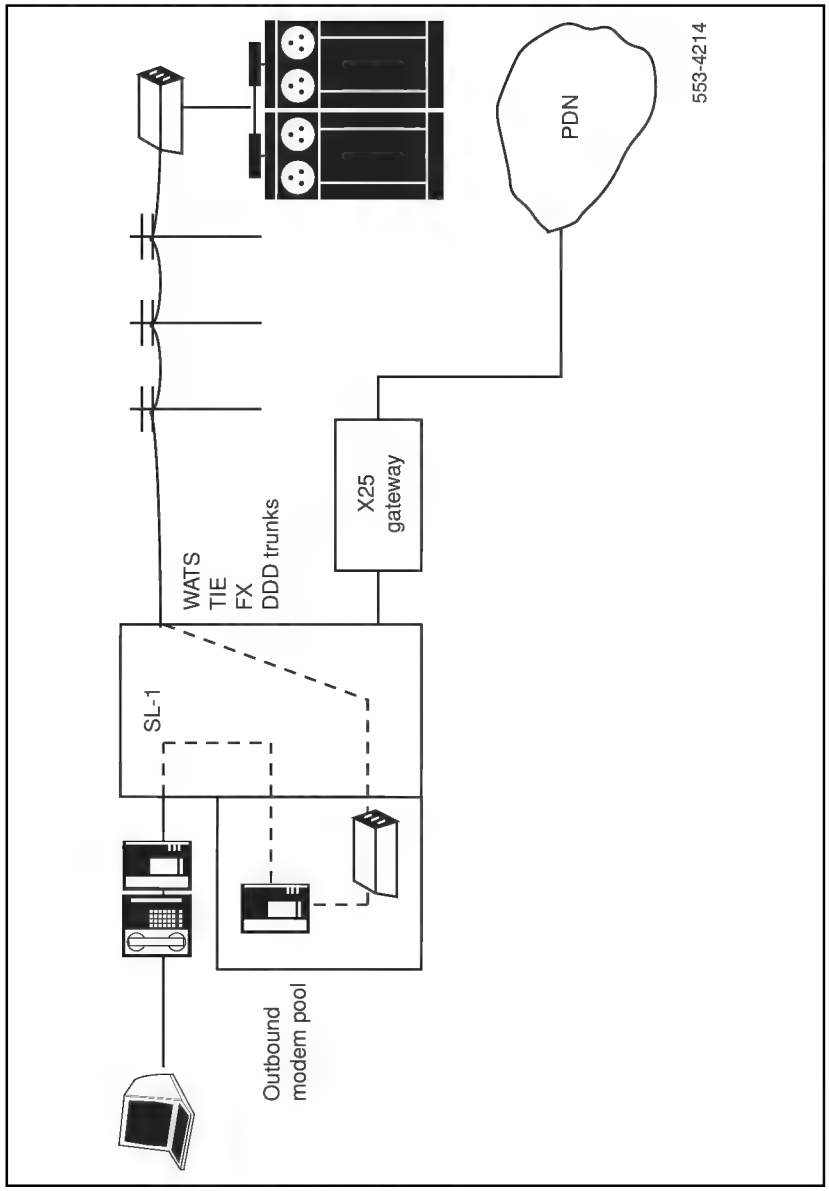


Figure 4
Remote Terminal to Local Device Data Call configuration

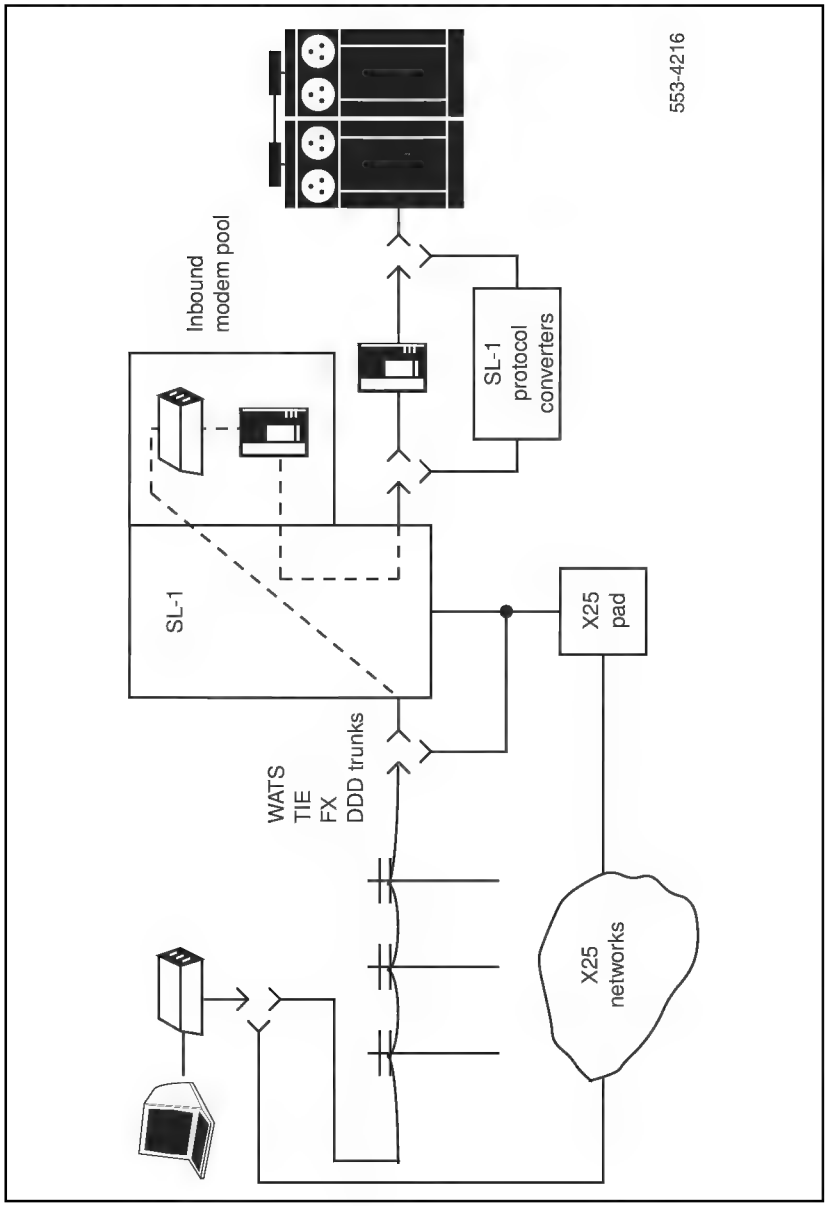
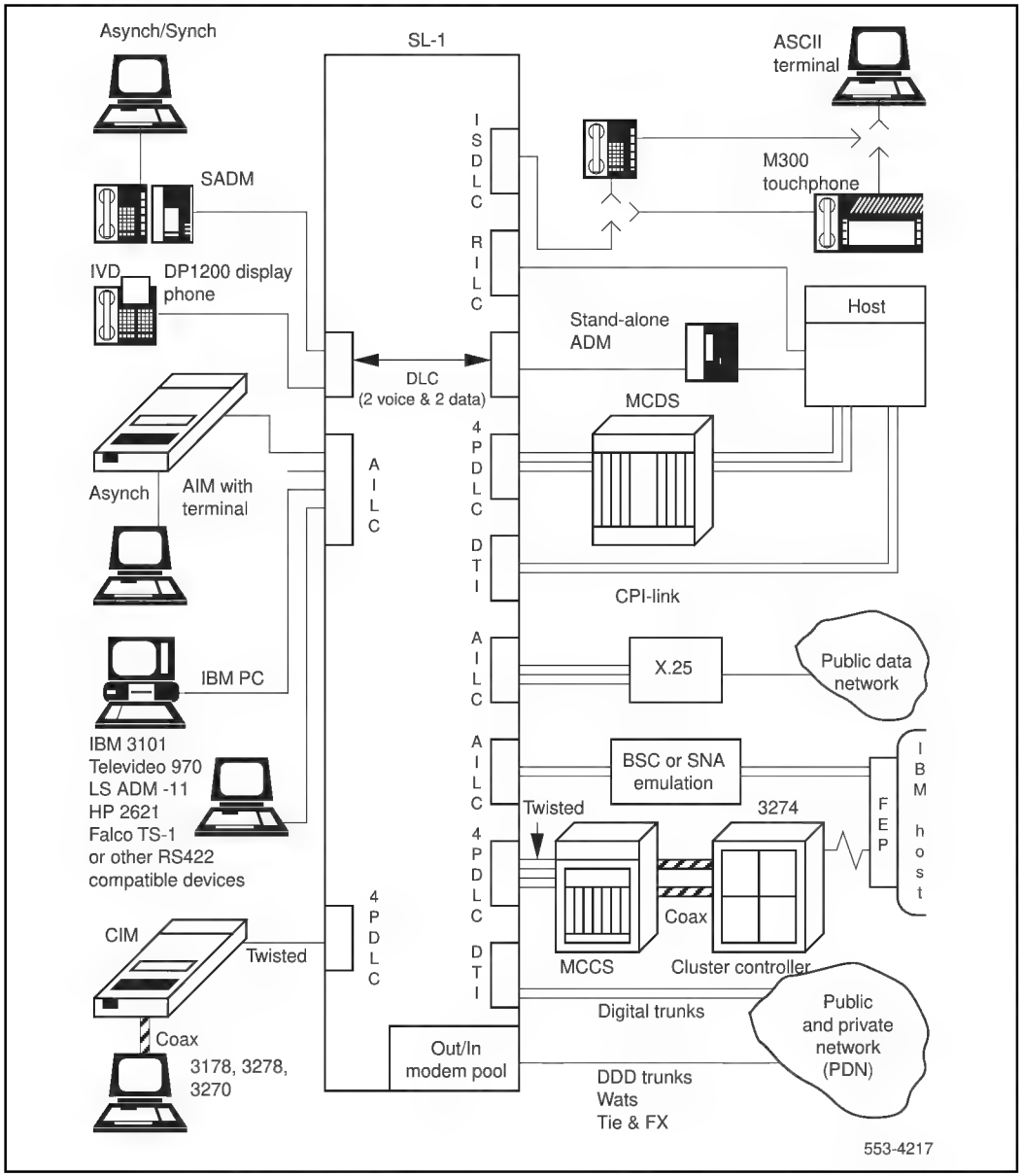


Figure 5
Overview of Meridian 1 Data Applications



Capabilities

Meridian Data Services allow for flexible configuration of data terminal equipment and permit the customer's data communications equipment to correspond to actual usage. The following is a summary of the advantages that implementation of the Meridian 1 data feature offers:

- Eliminates the need for separate voice and data switching systems and allows the use of common wiring.
- Provides efficient utilization of trunks or lines by eliminating the requirement for separate trunks or dedicated lines, as would be the case if a separate data switching system or private or leased lines were used.
- Extends to data users several Meridian 1 system and station features typically limited to voice calling only.
- Provides simultaneous voice and data calling capabilities through an SL-1 telephone using the standard two-pair wire.
- Allows convenient relocation of data terminal equipment.
- Allows multiple device access from data terminal equipment.
- Provides flexible operating distances of equipment (for example, terminals and computers) from the Meridian 1.
- Eliminates most equipment associated with fixed data configurations (e.g., base-band modems, dedicated telephone sets and wiring).
- Provides efficient use of computer ports through use of the queuing and hunting features offered by Meridian 1.
- Allows the voice-grade modems required for incoming/outgoing trunk calls to be shared between users and trunks on a non-dedicated hunt group basis. These modems can thus be supplied according to actual data traffic requirements.
- Allows the co-located ADM or AIM or ASIM to access the Serial Data Interface (SDI) port.
- Provides Synchronous Data Switching, Synchronous Keypad dialing, Asynchronous Keyboard Dialing (KBD) and Inbound Modem Pooling.

Offices that are equipped with the AMP feature do not require separate inbound and outbound modem pools. The other pooling requirements still apply.

Hardware

Configuring data features in the Meridian 1 may require different hardware components. The hardware items available are

Modules

- QMT7 Asynchronous Data Module (ADM)
- QMT8 Synchronous Add-on Data Module (SADM)
- QMT9 Asynchronous Interface Module (AIM)
- QMT11 Asynchronous Synchronous Interface Module (ASIM)
- QMT12 V.35 ADM
- Asynchronous Interface Line Unit
- Enhanced Asynchronous Interface Line Unit
- NT9N20 Coax Interface Module (CIM)
- Meridian SL-1/74 Protocol Converter
- Meridian SL-1/71 Protocol Converter
- Meridian SL-1/50 Protocol Converter (System 36 Gateway)
- SLX25-108A X.25 Gateway (110 V, 8-port)
- SLX25-116A X.25 Gateway (110 V, 16-port)
- SLX25-208A X.25 Gateway (220 V, 8-port)
- SLX25-216A X.25 Gateway (220 V, 16-port)
- Meridian M2000 or M2317 Digital Telephones

Circuit Cards

- QPC311(QPC341) Data Line Card (DLC)
- QPC432 4-Port Data Line Card (4PDLC)
- QPC353(QPC354) Modem Pool Line Card (MPLC)
- QPC60(QPC284) 500 Set Line Card
- QPC452 500 Set Line Card (Double Density)
- QPC397 4-port Multi-Channel Data System (MCDS) Asynchronous Card (MCDS-AC)
- QPC430 4-port Asynchronous Interface Line Card (AILC)
- QPC472 Digital Trunk Interface (DTI or CPI)
- QPC512 Personal Computer Interface (PCI) Card
- QPC578C Integrated Services Digital Line Card (ISDLC)
- QPC723 RS-232 Interface Line Card (RILC)
- NT9N02 MCCS Interface Card (CIC)

The A-Law equivalent circuit pack numbers, where available, are shown in brackets ( ) following the μ-Law numbers.

Miscellaneous

- QSD27 MCDS Shelf
- QSY27 MCDS Power Supply (110 V)
- QSY32 MCDS Power Supply (220 V)
- QCA76 Large MCDS Cabinet (optional)
- QCA77 Small MCDS Cabinet (optional)
- NT9N01 Multi-Channel Coax System (MCCS)
- Spectron Digital Patch Panel (optional)

Equipment description

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Reference list

The following are the references in this section:

- "Features and services" on page 49
- *Japanese features and services* (553-2001-100)
- *Meridian Data Features: Operations and Tests* (553-2731-300)
- *X11 Administration* (553-3001-311)

Add-on Data Module

The ADM is packaged in a molded chameleon gray plastic case 6.25 in (159 mm) wide. It has the same profile as the basic SL-1 telephone set and is equipped with a black faceplate.

The ADM is a microprocessor-controlled module which provides advanced data transmission features over a wide range of data rates. It eliminates unnecessary analog conversions between data terminal equipment and the Meridian 1 switching network by using digital transmission over existing 2-pair SL-1 set wire.

The ADM replaces base-band modems, acoustical couplers, and limited distance data sets for in-house data transmission activities. It extends several SL-1 station calling features to data calling use when installed on a standard SL-1 telephone. The ADM also provides switched, dial-up access from multiple in-house terminal equipment to shared dedicated or voice-grade modems for external data calling.

QMT7 ADM

The QMT7 provides asynchronous, half or full-duplex operation over 2- or 4-wire transmission lines and, depending on the terminal or modem used, transmission speeds of 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 7200 and 9600 bps. It accommodates a serial character data format of 5, 6, 7 or 8 data bits and 1, 1.5 or 2 stop bits (or as defined by the data unit).

The ADM is compatible with Bell 103/212/202 compliant modems and provides an EIA RS-232-C interface to data terminal equipment or modems. It converts the signals from the data equipment to full-duplex digital (128 kbits/sec, BPRZ encoded) to send to the Data Line Card (DLC) in the Meridian 1.

The ADM provides for re-down-line loading of RS-232 control signals. It also provides the following Data Call features:

- Flexible numbering plan for data stations
- Auto-answer capability
- Originate capability
- Voice path integrity in ADM power loss situations
- Alternate or simultaneous voice and data calling per data station
- Distinctive buzz for incoming data calls
- Distinctive connect tone
- Power Fail Protection

Note: Not all of the data modules have these features, i.e., not all have distinctive buzz, alternate or simultaneous voice and data capability. See module specifications.

The in-house error rate should be no greater than 1 error x 10^{-7} bits and the error rate over trunks should be no greater than 1 error x 10^{-5} bits (modem dependent).

Co-located ADM

When installed in the co-located mode, the ADM mounts on the right side of the telephone as the last add-on module.

- The ADM supports all data calling activities where the ability to originate and receive both data and voice calls is required.
- All co-located ADM modules permit the simultaneous voice and data transmission through a single telephone.
- The telephone calling features are available for data calls when a co-located ADM is used. These features are assigned to the ADM as with a telephone.
- The telephone calling features assignable to the ADM for data calls are located on and accessed from the key/lamp strip or through keyboard dialing when applicable.
- The ADM connects to the SL-1 set via two pair of leads. One pair extends the signaling leads from the SL-1 telephone to the ADM. The other pair connects the ADM to the signaling logic in the telephone.
- A data terminal or computer is connected to the ADM via a 25-pin connector on the rear of the module. This interface conforms electrically to EIA RS-232 standard and mechanically to ISO-2110.

Stand-alone ADM

The ADM can also be installed in a stand-alone mode to answer (cannot originate calls) calls as required for data-only in-house calling applications (for example, to support data service units, modems, printers, or computer ports) and for receiving incoming calls from trunks to a modem pool or to a dedicated facility.

In the stand-alone mode, an SL-1 telephone is not required. The ADM is in an answer-only mode, the same as it is when interfaced to a computer port or front end processor.

Modem Pool ADM

The ADM may be configured as modem pools (see "Features and services" on page 49). The Outbound Modem Pool is accommodated by outgoing standard voice grade or conditioned lines and provides for asynchronous or synchronous transmission. The Inbound Modem Pool supports synchronous modems to single hosts. Only asynchronous modems are supported for access to multiple or remote hosts. Modem pools of different types (speed or transmission mode) must be kept separate.

> ***Note:*** Offices that are equipped with the AMP feature do not require separate inbound and outbound modem pools. The other pooling requirements still apply.

User controls, indicators, and settings

The ADM has three key/lamp data call controls and three transmission and one power status lamp indicators, plus user-selectable transmission speed and parameter option switches.

The ADM contains internal option switches and jumpers selected according to customer configuration, and a switch for setting the Voice Frequency Directory Number (VFDN). The VFDN is used to set up the connection through the Meridian 1 from the analog side of the pooled modem to the outgoing trunk.

The location of all ADM controls, indicators, and option selectors is shown in Figure 7. All controls and indicators are described in Table 1. Both option selectors, the speed-setting knob, and option switches are described in Table 2.

Configurations

Each ADM is entered in the Meridian 1 office data in the same manner as an SL-1 telephone, using LD 11. Instructions for assigning DDN, data hunt groups, and key/lamp features are included in *X11 Administration* (553-3001-311).

Operating Distances

The ADM allows different maximum separation distances from the Meridian 1 peripheral equipment and computers depending upon gauge of wire used to make the connections. Maximum end-to-end distance between ADM can be up to 8000 ft (2440 m) on 22 gauge or 7,000 ft (2134 m) on 24-gauge wire. A computer or terminal can be located as far from the ADM as is consistent with EIA RS-232 loading specifications.

Miscellaneous

The ADM provides loopback testing maintenance diagnostics that are inherent in the Meridian 1 software to the called data module.

The ADM derives 24 V ac, 50–60 Hz power from a local plug-in 110 or 220 V ac transformer.

Note: A 100 V ac transformer is available for use in Japan.

Table 1
ADM controls and indicators

Controls and indicators	Definition
DATA key	Data DN key—used for originating and answering data calls
Lamp	Data DN lamp—indicates the call state of DDN: ON—active call OFF—idle WINK—incoming call
MODEM CONTROL key	Used during call setup to a remote device
Lamp	Indicates MODEM CONTROL key status: ON—modem in use OFF—no modem in use WINK—modem reserved
DATA SHIFT key	Used to shift companion SL-1 telephone from voice mode to data mode; feature-key activations made on an SL-1 telephone during data mode then relates to the DDN
Lamp	Indicates the activation of DATA SHIFT key and operating mode of SL-1 telephone: ON—SL-1 set in data mode OFF—SL-1 set in voice mode
RESET	Located on the rear of vintage B and later ADM—used to effect initialization
CONNECT lamp	Indicates if a connection is established with a called ADM: ON—connection established OFF—no connection
RECEIVE lamp	Indicates if the ADM is receiving data from the called facility: ON—ADM receiving data (flashes at data rate) OFF—ADM not receiving data
SEND lamp	Indicates if the ADM is transmitting data to the called facility: ON—ADM sending data (flashes at data rate) OFF—ADM not sending data
POWER lamp	Indicates if local power is being supplied to the ADM: ON—power up OFF—power down

Table 2
ADM user option selectors (Part 1 of 3)

Selector	Description
Speed setting knob (S2)	A 16-position switch used to select transmission speed (bits per second) of a data call (Notes 3 and 4).
Option switches (S3)	The eight switches allow selection of data code options and operating modes that match the receive and transmit characteristics of the receiving data terminal.
Asynchronous ADM Operation	The asynchronous ADM has an 8-bit transmitter/receiver. To handle all of the combinations of codes it might receive or need to transmit, which might be less or greater than 8 bits, the ENH-INH and EVEN-ODD switches allow it to add or delete bits to make the code always equal 8 bits. Most devices today use the 8-bit code, so the INH and 8 CODE switches are normally operated. When INH is operated, the EVEN-ODD switch setting is ignored.
ENH—INH	ENH allows the parity check; this allows the addition of a non-information bit to the data, making the number of ones in a grouping of binary bits always even or odd. INH prevents the addition of the parity bit.
EVEN—ODD	This determines the parity check type, EVEN, when the number of binary ones in a data word is always maintained as an even number or ODD, when the number of ones in the data word is odd.
HDX—FDX	Provides for the transmission aspects: HDX when half-duplex direction of transmission is under dynamic control of EIA leads CTS, RTS, and CD (this switch provides local carrier monitoring of local request-to-send to ensure compatibility with 2-wire modem); FDX when full-duplex communications is required.
7—8 CODE	Transmission codes use different character lengths and different start/stop bit configurations. This switch and the selection switch (S4) provide for 5 through 8 character codes (Note 1).
1—2 STOP	This switch and selection switch (S4) provide the correct stop bits to match the required code configuration (Noteþ1).

Table 2
ADM user option selectors (Part 2 of 3)

Selector	Description
2W—4W	The 2W position provides for local echo while the 4W position does not provide for echo. The QMT8 labels this switch as Echo—No Echo.
ECHO—NO ECHO	This is a QMT8 switch assignment: The Echo position provides for local echo, while the No Echo position does not provide for echo from the ADM.
MANUAL—AUTO ANS	This establishes how calls to the ADM are answered: manually or automatically.
OFF—LOOPBACK	This switch is used by maintenance personnel to test ADM using the loopback setting. The switch is OFF during regular transmissions (Note 2).
Synchronous ADM Operation (QMT8 and higher)	
S3.1 and S3.2	(Not used by synchronous QMT8 or QMT12)
HDX—FDX	Provides for the transmission aspects: HDX when half-duplex direction of transmission is under dynamic control of EIA leads CTS, RTS, and CD (this switch provides local carrier monitoring of local request-to-send to ensure compatibility with 2-wire modem); FDX when full-duplex communications is required.
Modem—Network	This is a synchronous QMT8/QMT12 switch assignment: Modem is used (clocks are not synchronized) for all connections except for connections to a digital network; Network is used when the transmit and receive clocks are jointly synchronized.
Extpclock—Intpclock	This is a synchronous QMT8/QMT12 switch assignment: Ext clock is used when a device connected to the ADM controls the transmission clock; Int clock is used when the Meridian 1 controls the transmission clock.

Table 2
ADM user option selectors (Part 3 of 3)

Selector	Description
Echo—No echo	This is a synchronous QMT8/QMT12 switch assignment: The Echo position provides for local echo while the No Echo position does not provide for echo from the ADM.
Manual—Auto Ans	This establishes how calls to the ADM are answered: manually or automatically.
Off—Loopback	This switch is used by maintenance personnel to test ADM using the loopback setting. The switch is OFF during regular transmissions (Note 2).

Note 1: Selection switch (S4) is located beneath the faceplate and should be set by maintenance personnel only. The QMT7 (S4) selection switches are used to set up for 5- or 6-bit code, for 1.5 stop bits, and to force DTR and MI/MIC modem control on or off. The QMT8/QMT11/QMT12 (S4) selection switches are used to set up for Synchronous or Asynchronous modes, force DTR on or off, set MI/MIC modem control on or off, and to encode for normal (7 or 8 bit), 5-bit, 6-bit, and hotline (with 7- or 8-bit only) operation. The 1.5 bit option is provided (in the asynchronous mode only) when the speed setting switch is set at 134.5 bps.

Note 2: Use of the LOOPBACK setting is recommended only for maintenance personnel. Instructions for use of the LOOPBACK setting are given in *Meridian Data Features: Operations and Tests* (553-2731-300).

Note 3: The control label under the flip lid has all speeds shown. Speeds above 19.2 kps are in a different color for informational purposes. At speeds above 20 kbps, the EIA cable lengths (DTE or DCE to ADM) are speed-dependent and must be shorter than 50 ft (15 m); e.g., in the 5 to 8 ft (1.5 to 2.5pm) range at 56 kbps.

Note 4: The serial number and Q-code label on the bottom of the ADM contains the interface information and provides a reference to the connector type.

QMT8 SADM

The QMT8 has the same profile as the QMT7, but it supports both asynchronous and synchronous data transmission. A service switch is used to change from one mode of transmission to the other. The QMT8 can operate in the same configuration as the QMT7.

The QMT8, when operating in the asynchronous mode, can operate at 19200 bps in addition to speeds specified for the QMT7. The QMT8 also supports the inbound modem pooling and keyboard dialing features.

When operating in the synchronous mode, the QMT8 can transmit data at 1200, 2400, 3600, 4800, 7200, 9600, 14400, 19200, 38400, 40800, 48000, or 56000 bps. Some of the QMT8 controls are different and are defined in Table 2.

> ***Note:*** For QMT8 with RS-232 interface at speeds above 20 kbps, the EIA cable lengths (DTE or DCE to ADM) are speed-dependent and must be shorter than 50 ft (15 m); e.g., in the 5 to 8 ft (1.5 to 2.5 m) range at 56 kbps.

QMT12 ADM

The QMT12 (V.35) ADM has the same profile as the QMT7 and QMT8. However. the QMT12 provides high-speed V.35 CCITT synchronous instead of a RS-232 interface to data terminals or modems. The QMT12 interface conforms electrically to the CCITT V.35 standard and mechanically to ISO-2110. The QMT12 provides for the same data transmission speeds as the QMT8 synchronous ADM; 1200, 2400, 3600, 4800, 7200, 9600, 14400, 19200, 38400, 40800, 48000, or 56000 bps. The controls and option selectors are similar to the QMT8 and are described in Tables 1 and 2.

> ***Note:*** The RS-232-C (QMT8) DCE/DTE interface is normally used for low-speed data rates (up to 19.2 kbps) while the V.35 (QMT12) interface is used when high-speed (38.4 to 56.0 kbps) data rates are required. However, synchronous terminals operate with whatever clock they receive. Therefore, a user with a V.35 terminal can set the speed switch to a low speed and call an RS-232 modem. A different color is used on the speed indicator card of the QMT12 to indicate the higher speeds.

The V.35 CCITT interface should only be used in the synchronous operating mode.

The QMT12 supports four basic modes of synchronous data transmission operation:

- terminal to terminal
- terminal to digital network
- terminal to modem
- terminal loopback test

While the QMT12 is equipped with a V.35 CCITT interface, wire changes within the module can be used to establish an RS-232-C interface.

> ***Note:*** Unless stated otherwise, all further ADM references in this publication imply QMT7, QMT8, and QMT12.

Data Line Card

The DLC is located in a Peripheral Equipment (PE) shelf. It encodes information streams received from the ADM and routes this information through the Meridian 1 switching network to the called data facility (computer or terminal).

The QPC311 DLC supports two SL-1 telephones and two ADMs, either in independent or paired operation. The DLC data ports can support two MCDS-AC ports, two CIC ports, two ASIMs or two CIMs. Microprocessor control allows the DLC to separate incoming voice signals, data signals, and actual data, and route this information through the switching network.

The DLC contains an option switch used to link or isolate operation of each SL-1/ADM circuit pair as required and jumper positions for wire gauge selection.

4-Port Data Line Card

The 4PDLC is located in a Peripheral Equipment (PE) shelf. It meets the physical and electrical specifications of any DLC to data-module interface and provides access to network channels for data information. The 4PDLC is used in applications that require a large concentration of data ports.

It provides four SL-1 data only ports and is primarily designed to serve MCDS-AC, ASIM, CIM, CIC, and stand-alone ADM.

The 4PDLC does not support calls that involve voice ports such as in outbound modem pool calls. The 4PDLC accepts both voice and data call signals but does not distinguish between them and therefore cannot be used in cases where both types of signals are present.

The 4PDLC has one LED indicator on the faceplate that is lit when the card is disabled.

Modem Pool Line Card

Outbound Modems

The MPLC (QPC353) contains four ports and is used exclusively in asynchronous outbound modem pool configurations to support originate modems. It provides the Voice Frequency Directory Number (VFDN) for call connection on the analog side of an outbound pooled modem. The synchronous outbound modem pools use the regular QPC60 line card (or the double density line card [QPC452] that contains eight instead of four ports).

The MPLC is used with originate/answer modems. There are four identical circuits on each card and they prevent ring voltages from being applied to ensure that each modem remains in the originate mode during call setup.

Inbound Modems

The regular 500-set (or double density) line card is used for asynchronous and synchronous inbound modem pool configurations.

Supplementary power unit

Each stand-alone and some co-located ADMs must be powered from a supplementary power unit. The supplementary power unit used is a wall or floor-mounted plug-in transformer that supplies 24 V ac ±10%.

In the event that the local power to a co-located ADM fails, an optional Power Failure Transfer (PFT) capability can be implemented to ensure that the SL-1 telephone continues to function. Individual and/or zone PFT can be used.

RS-232 cord assemblies (NE-25MQ2A)

The NE-25MQ2A (A0237451) cord assembly is a 16 ft (5 m), 25-wire cable, connectorized at both ends. It provides electrical interface and proper configuration of control signals between the ADM and Data Terminal Equipment (DTE). A shorter 6 ft (1.8 m) NE-M25QB (A0273211) cord may be used instead of the longer cord.

Modem pool cable (QCAD5A)

The QCAD5A connector cable (A0277406) is similar to the NE-25MQ2A cord assembly, but includes a special relay and associated wiring to provide the necessary electrical interface and proper configuration of operating modes of the attached modem. This cable is only used for asynchronous outbound modem pools.

QMT9 AIM

The Asynchronous Interface Module (AIM) is packaged in a chameleon ash-colored plastic housing that is 12.5 in (317.5 mm) long, 7.5 in (190 mm) wide. The module has a 4° slope with a front height of 1.75 in (44.5 mm) and a rear height of 2.75 in (70 mm). It weighs approximately 2 lb (1 kg).

The AIM may be desktop or wall mounted and is used to originate or answer data calls. It supports keyboard dialing.

Features

The AIM is a stand-alone module, equipped to transmit and receive data. It meets the DTE/DCE interface requirements of the EIA RS-232-C standard. The electrical characteristics of the interface to the associated Asynchronous Interface Line Card (AILC) meets the EIA RS-422 requirements. The AIM provides substantial electrical isolation between the RS-232 and RS-422 interfaces.

The AIM transmits data at 110, 150, 300, 600, 1200, 2400, 4800, 9600, and 19200 bps. Speeds are determined by an autobauding procedure in the AILC.

> ***Note:*** With the QPC430E and later vintage AILC, many of the features of AT-type dialing are supported, as well as the set relocation feature. See the AIM/AILU User Guide for details. For more details, refer to *Japanese features and services* (553-2001-100), but disregard all references to Manual Answer.

A standard 500/2500 telephone may be plugged into the rear of the AIM into the phone jack. This telephone then operates through the AIM line cord to a standard 500-set line card in the Meridian 1.

Controls and indicators

The module is equipped with a power on/off switch and with a power on indicator.

Configuration

The AIM provides the interface between an RS-232-C compatible asynchronous DTE through its AILC.

The connection to the AILC is made via a miniature 6-position jack mounted on the rear of the housing. The module is equipped with a 7 ft (3.1 m) 6-conductor cord that is terminated with miniature 6-position plugs on each end. The connection to the 110/220 V ac transformer is made with a 7 ft (3.1 m) 2-conductor cord that is attached to the rear of the unit.

The AIM can only be connected to the AILC. It cannot be connected to the DLC.

The AIM connects to the DTE through a 25-pin connector (that conforms to ISO-2110) that is mounted on the rear of the housing.

AIM can be connected in the back-to-back mode if the send pairs of one set are connected to the receive pairs of the other set and vice versa.

Asynchronous Interface Line Card

The AILC contains all the intelligence for the AIM. It is located in a PE shelf and is used with and encodes information streams received from the AIM. It routes this information through the Meridian 1 switching network to the called data facility (computer or terminal).

> ***Note:*** The AILC may also be used to connect the Meridian 1 switching machine terminals, protocol converters, interface boards, X.25 gateways, and other data transmission devices that use an RS-422 compatible interface.

The AILC supports up to four AIM units. Each of the four channels has a microprocessor that emulates the ADM to the Meridian 1 system, a switching power supply, and other electronic components. The transmission between the AIM and the AILC conforms to EIA RS-422 standards.

Operating characteristics

The AILC communicates with DTEs that have the following characteristics:

Data Code	ASCII (ANSI standard X3.4)
Terminal	Asynchronous, Start-Stop (ANSI standard X3.15-1976)
Number of Bits	8-bits including parity
Parity	unchanged
Data Rate	110, 150, 300, 600, 1200, 2400, 4800, 9600, 19200 bps
Stop Bits	2 bits for 110 bps, 1 bit for all other speeds

When installing or maintaining the AILC with either an AIM or Personal Computer Interface Card (PCIC), it is important to consider that AIM/PCIC to AIM/PCIC calling is not supported at 110 or 150 bps.

QMT11 ASIM

The Asynchronous Synchronous Interface Module (ASIM) looks very much like the AIM, but provides added dialing capabilities plus six data feature keys and associated lamps and data control switches.

The data control switches are in a recessed area covered with a flip-up lid. User instructions are provided on the underside of the lid. The controls allow the user to choose data mode and speed.

A 12-button dial pad plus feature keys and data status lamps are located in front of the flip-lid.

An SL-1 set or an NT-500 type set may be connected to the ASIM for making voice calls. The NT-500 type set may be placed on the top surface without blocking the dial pad or the feature keys.

The ASIM may only be desktop mounted and is used to originate or answer data calls. In the asynchronous mode keyboard or keypad dialing may be used. In the synchronous mode, only keypad dialing is permitted.

Features

The ASIM is a stand-alone module, equipped to transmit and receive data. It meets the DTE/DCE interface requirements of the EIA RS-232-C standard. The electrical characteristics of the interface to the DLC or to a 4PDLC port are the same as for the ADM. It cannot be used for modem pooling.

The Asynchronous ASIM transmits data at 110, 150, 300, 600, 1200, 2400, 4800, 9600, and 19200 bps. When first turned on, ASIM selects a default of 1200, 2400, 4800, 9600, or 19200 bps as determined by the synchronous speed switch setting. If the switch is not set to any of these speeds, a default speed of 9600 bps is selected. Speeds and parity are then determined by an autobauding and autoparity feature.

The Synchronous ASIM transmits data at 1200, 2400, 3600, 4800, 7200, 9600, 14400, 19200, 28800, 38400, 40800, 48000, or 56000 bps. These speeds are selected by the synchronous speed switch setting.

A standard 500/2500 or SL-1 telephone may be plugged into the rear of the ASIM into the phone jack. This telephone then operates through the ASIM line cord to a standard 500 or SL-1 line card in the Meridian 1.

Controls and indicators

The module is equipped with a speed switch (synchronous), eight mode switches, a keypad dial, data status lamps, and feature/feature keys.

The recessed 8-position DIP switch provides for Hotline, Forced DTR, Manual/Auto Answer, Loopback, Async/Sync, HDX/FDX, Ext/Int Clk, and Modem/Network (the last four functions are not applicable with Asynchronous operation). The switches are set by the user to match the data setting of the DTE. Refer to Table 2 for more details.

Note 1: When the ASIM is in the asynchronous mode, the Terminal setting enables the dialing menus, progress prompts, and other responses sent to the DTE. In this mode, DSR, DCD, and CTS are high at all times. When the call is disconnected, DSR, DCD, and CTS pulse to a space state for 200 msec and then return to a mark state.

Note 2: When the ASIM is in the asynchronous mode, the Host setting suppresses all prompts to the DTE. The implementation of this mode in the C or earlier vintage held DSR, DCD, and CTS high when the call was not established. The QMT11D vintage keeps DSR, DCD, and CTS low until the call is connected and then raises them high.

Note 3: When the ASIM is in the Hotline mode with Forced DTR on (VLL mode), the ASIM waits 1.5 seconds after a call is disconnected and then begins to use the Hotline mode continuously until the call is reestablished. It can be stopped by setting either the Hotline or Force DTR switch to the OFF position.

Note 4: When the ASIM is set in the VLL mode, Int Clk, Modem, and Sync setting, the Transmit Clock EIA lead (pin 15 of DB-25) continuously outputs the clock signal, regardless of the state of the call.

Note 5: Only one side of the data connections should have the Hotline or VLL turned on. Otherwise, both data modules will be trying to call each other and will never connect.

The function switches provide for Speed Call, Autodial, Modem Call, Ring Again and Release. These switches and the DDN switch (hookswitch) are used to originate and to answer data calls. The top Reserved key (the one under Ring Again) in conjunction with the "*" and "#" keys provide for the ASIM automatic relocation feature.

The definitions of the Data Status lamps are as follows:

Indicator	Description
CONNECT	The CONNECT LED lights when a call is connected from the Meridian 1 through the ASIM to the attached device.
DTR	The DTR LED lights to indicate that DTR is received from the attached device.
RD	The RD LED lights when data is received by the ASIM.
SD	The SD LED lights when data is transmitted by the ASIM.

Configuration

The ASIM provides the interface between an RS-232-C compatible asynchronous DTE through a DLC OR 4PDLC.

The connection to the DLC or 4PDLC is made via a miniature 6-position jack mounted on the rear of the housing. The module is equipped with a 7 ft (3.1 m) 6-conductor cord that is terminated with miniature 6-position plugs on each end.

The connection to the power supply (120 V 60Hz ac input) is made with a 5-conductor cord equipped with a connector that plugs into the main assembly of the ASIM.

The ASIM connects to the DTE through a 25-pin connector (that conforms to ISO-2110) that is mounted on the rear of the housing.

PC Interface Card

The Personal Computer Interface Card (QPC512) permits connection of an IBM Personal Computer or IBM Personal Computer XT directly to the Meridian 1 with standard twisted pair wiring. The card installs easily in the Personal Computer, allowing the computer to be connected to the Meridian 1 through a standard TELADAPT wall jack and the QPC430 AILC. The PC may then access local and remote terminals, personal computers, other computers, and databases using the Meridian 1 networking capability. The card transmits data to the AILC using the RS-422 data standard and functions with any Meridian SL.

The Personal Computer Interface Card User Guide (P0641829) provides installation and operating information.

> ***Note:*** The Crosstalk XVI software is available as an option for use with the QPC512.

Protocol Converters

IBM users have traditionally been locked in to IBM. This meant that the 3270 family of display and controllers and coaxial cable distribution was necessary to access IBM hosts. Communication with non-IBM hosts from IBM Systems 34, 36, 38, and IBM 3270 terminal equipment was very difficult or impossible.

The Meridian 1 family of Protocol Converters are devices that enable ASCII terminals, printers and personal computers to communicate with IBM computers. Different makes and types of terminals can now be used in the IBM environment.

The System 36 Gateway and 3270 Protocol Converter provide a flexible, cost-effective alternative to an IBM system of dedicated terminals and controllers. In addition, the Hunting, Autodial, and Ring Again Meridian 1 data features may be used in establishing the data calls.

The protocol converter emulates an IBM cluster controller and can access a variety of IBM applications. ASCII terminals can now be connected to the IBM link using standard telephone twisted pair cable. The ASCII terminals may be located up to 4000 cable feet from the Meridian 1 or dialed in through a modem pool. The protocol converter may also be located 4000 cable feet from the Meridian 1 and a maximum of 50 cable feet from the IBM host for direct connections or unlimited with modem pairs.

This makes moves and changes less costly and the IBM user may now benefit from the added features of Ring Again, Auto Dial, Speed Calling, and other data call processing features.

The Meridian 1 Protocol Converter is 12 in (305 mm) long, 14 in (356 mm) wide, 4.5 in (115 mm) high and weighs 8 lb (3.6 kg). It operates in an office environment of 26°F to 91°F (10°C to 35°C) with a 20 to 80% relative humidity. It requires a 110 V ac, 60 Hz, 1 amp circuit. It can be mounted in the MCDS cabinet, in a standard EIA 19 inch rack or may be ordered as a desk-top module. It is connected to the Meridian 1 through an AILC.

The converter provides asynchronous ports for eight logical units: seven asynchronous ports and one dynamic printer port. A logical unit is assigned to each of the seven physical asynchronous connections. The eighth logical unit is a printer port that can be dynamically assigned to auxiliary ports associated with CRT connected to the seven asynchronous physical ports. The ports operate at speeds of 300, 600, 1200, 2400, 4800, or 9600 bps.

The converter provides one synchronous, full duplex/half duplex port that supports direct FEP connection (built-in modem eliminators) or remote connection via dedicated or dial up modems. This port provides clocking speeds of 1200, 2400, 4800, or 9600 bps and multi-drop configuration over private lines.

There are presently three basic versions available:

- The Meridian 1/74 Protocol Converter is an ASCII to SNA/SDLC (PU type 2) device that emulate the IBM 3274 and 3276 controllers.
- The Meridian 1/71 Protocol Converter is an ASCII to BISYNC device that emulates the IBM BSC 3274 controller.
- The Meridian 1/50 Protocol Converter (also called System 36 Gateway) is a device that emulates ASCII to SNA/SDLC for IBM System 34, 36, or 38.

A detailed Technical Reference Manual, an Operator's Guide and a User's Quick Reference Guide are available for each member of the family. These documents provide information for ordering, installation, operation, maintenance, troubleshooting, debugging, and diagnostics.

These manuals also provide a partial list of the ASCII terminals and printers that are supported, plus cross-reference sheets of keyboard emulations for those terminals.

Multi-Channel Data System

The MCDS is designed for use in computer rooms to provide rack mounted ADM-like asynchronous capabilities for interfacing multiple computer ports to the system. It consists of a shelf, power supply, a maximum of eight interface cards, backplane, patch panel (optional), and cabinet (optional).

The interface between the MCDS and the computer ports must conform to the EIA RS-232-B/C specifications.

Incoming Asynchronous calls to the MCDS may originate from QMT7, QMT9, or asynchronous QMT8s that use full/half duplex mode of operation and operate with data speeds of 110, 150, 300, 600, 1200, 2400, 4800, 9600, and 19200 bps. The MCDS interface card (AC) only supports data terminals that use 7-bit ASCII or 8-bit EBCDIC code 1 or 2 stop bits with odd or even or no parity.

Asynchronous Card

The 4-port MCDS-AC is located in the MCDS cabinet and supports four computer ports (or any other device that requires answer only). It provides the drivers and receivers required to meet the electrical interface specifications of the RS-232-C EIA standard. The MCDS-AC provides the same functions as four stand-alone ADMs.

The controls and indicators located on the circuit pack are described in Table 3.

Table 3
MCDS indicators and switches

Indicator	Description
CONN	The CONN LED is located on the MCDS-AC. It lights when a call is connected from the Meridian 1 through the card to the attached device.
DTR	The DTR LED is located on the MCDS-AC. It lights to indicate that DTR is received from the attached device or forced ON at the MCDS-AC.
RD	The RD LED is located on the MCDS-AC. It lights when data is received by the card.
SD	The SD LED is located on the MCDS-AC. It lights when data is transmitted by the card to the far end.
POWER	The POWER LED is located on the front panel of the MCDS power supply. It lights when the ON—OFF switch is operated to ON
ON—OFF	The POWER switch is located on the front panel of the MCDS power supply. It is used to turn the power supply on or off. The switch should be OFF when inserting or removing the supply from the shelf.
Voltage Test Points	The VOLTAGE TEST POINTS are jacks that are located on the front panel of the power supply. They provide test points to verify the + 5, + 12, + 9, and –9 V that are supplied by an energized power supply.
PORTS	The port designations, located on the front panel of the power supply, provide legends for the MCDS-AC located in the right half of the shelf.

MCDS Power Supply

The off-line switched-mode power supply, located in the center of the MCDS shelf, provides multiple, regulated, and protected DC voltage to the MCDS backplane. It supplies steady-state 140 watt multiple, regulated, and protected DC voltage to the backplane from 120 V ac 60 Hz input. Each shelf requires 1.7 A from the 120 V input.

Spectron Patch Panel

This optional patch panel is wired between the interface card ports and the computer ports to provide a convenient means of rearranging interconnections and for maintenance diagnostics.

X.25 Gateway

The X.25 Gateway is a Packet Assembler/Disassembler (PAD) that provides an interface between asynchronous (start/stop) ASCII devices and packet switched equipment. The X.25 Gateway PAD supports the X.25 synchronous interface and conforms to all applicable international standards, including X.25, X.3, X.28, and X.29.

The X.25 Gateway PAD is 10.5 in x 16.75 in x 5.25 in (263 mm x 419 mm x 132 mm) and may be mounted in 19-inch frames or used as a stand-alone desk top unit.

The X.25 Gateway provides a cost effective communication link between the Meridian 1 and various X.25 networks. This allows various non-compatible computer systems to communicate with one another.

The PAD provides for 8 or 16 asynchronous ports (RS-422 interface) that connect to ports of an Asynchronous Interface Line Card (AILC) and two synchronous trunk lines (RS-232-C/V.24 interface) that connect to Public Data Networks (PDN) or to private data networks. The asynchronous ports operate at 300, 1200, 2400, 4800, 9600, and 19200 bps. The two synchronous trunk lines operate at 1200, 2400, 4800, 9600, and 19200 bps.

The X.25 Gateway permits building what appears to be a private data network by using PDN services and a network of remotely located Meridian 1s. The computer systems connected to the Meridian 1 may communicate together through the network. This emulation of a private data network can be expanded to include stand-alone computers and access to services of time-shared systems and large public databases, i.e., Dow Jones, Dun and Bradstreet, the Source, and industry-specific data bases.

Configurations

ASCII workstation to PDN With this configuration, the PAD provides the Meridian 1 connected workstations with X.25 access to the PDN. The Meridian 1 is used as a workstation, and/or asynchronous host port concentrator, that allows workstations to contend for one of the 8 or 16 asynchronous ports on the PAD and to access one of the two X.25 synchronous links.

ASCII workstation to private switched network In this instance, the PAD is configured to provide the Meridian 1 workstations with access to a private packet switched data network. Two or more Meridian 1 switches can be interconnected by the X.25 links. Permanent virtual circuits (PVC) or a dedicated line can be used to form a private data network.

ASCII workstations access to multiple networks The Gateway supports two links and allows simultaneous connections to two PDN or private networks. The Gateway emulates the connection procedures (user interface) of the major North American, European, and Japanese networks such as GTE/Telenet, Tymnet, Datapac, UK PSS, Transpac, Uninet, Datex-P, and DDX.

Figure 6
Typical Multi-Channel Data System

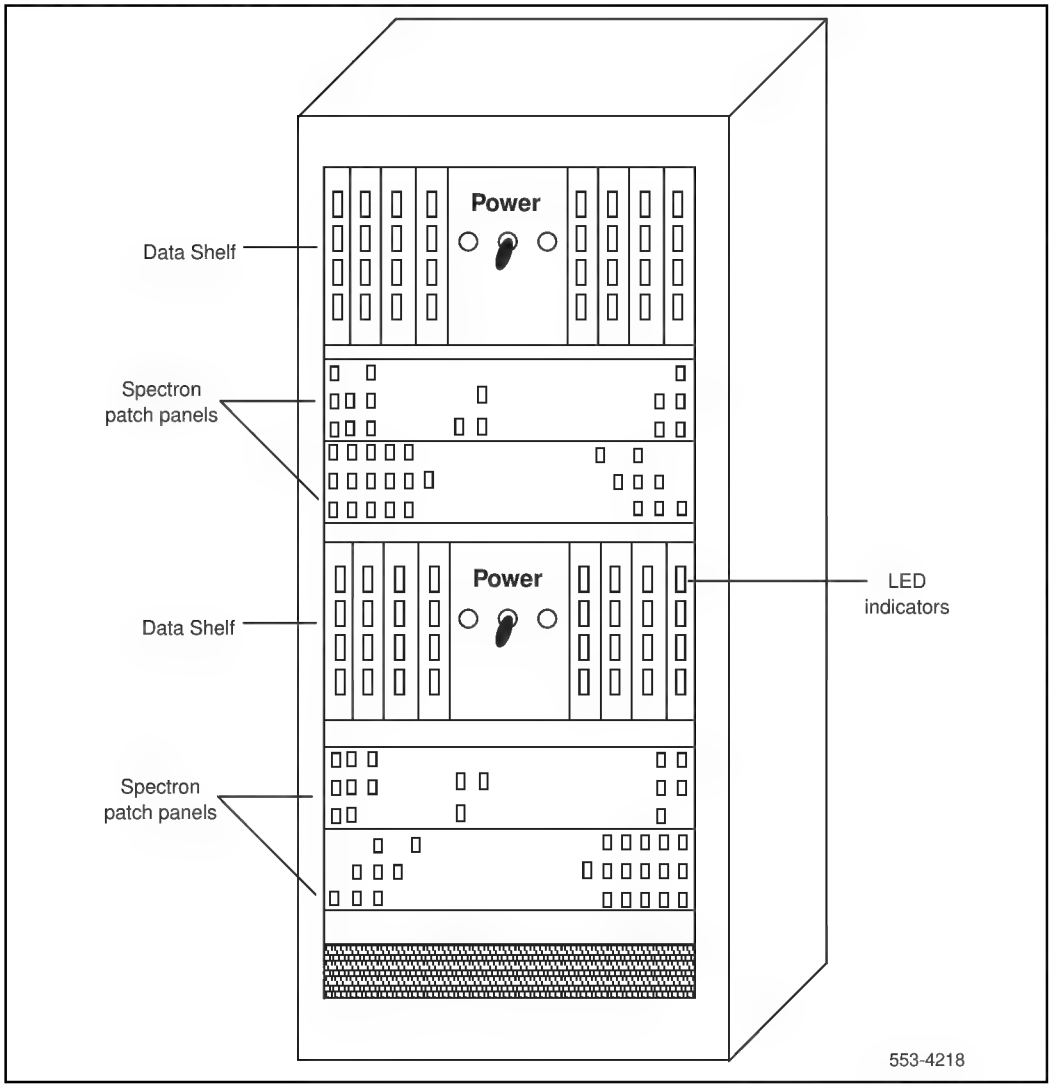
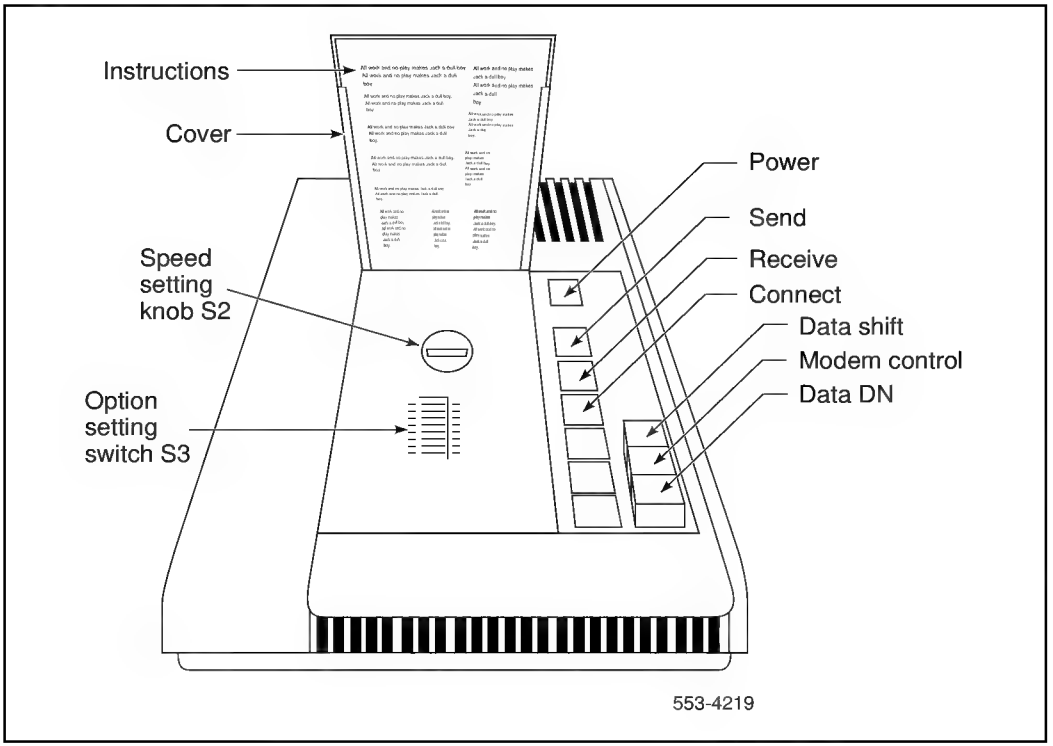


Figure 7
ADM Controls and Indicators



Features and services

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Reference list

The following are the references in this section:

- *X11 Features and Services* (553-3001-306)
- *Call Detail Recording: Description and Formats* (553-2631-100)
- *Meridian Data Features: Traffic Engineering and Configuration* (553-2731-151)
- *Transparent Data Networking* (553-2731-110)
- *Meridian Communications Unit and Meridian Communications Adapter: Description, Installation, Administration, Operation* (553-2731-109)

Several system and telephone features are available for use with Meridian Data Services. These features and their operation and/or interaction when used in conjunction with data calls, are defined under subsequent headings.

Refer to the specific data document listed at the beginning of this document or *X11 Features and Services* (553-3001-306) for more information regarding system and telephone features.

Automatic Dialing

Description This feature allows a station user to dial a directory number by pressing a single key. The user may change the number associated with Autodial at any time. The directory number may include trunk access and area codes.

Interaction This feature, when assigned to a co-located ADM, is accessed from the telephone once the DATA SHIFT key is pressed on the ADM. If also assigned to the companion telephone, the feature will operate independently; i.e., programming and use apply to data (DATA SHIFT lamp steadily lit) or voice (DATA SHIFT lamp dark). The feature can also be accessed from an AIM or from a co-located ADM with keyboard dialing.

Call Forward All Calls

Description A data station with this feature may have all calls which are directed to the DDN automatically forwarded to another data station DDN within the customer group.

Interaction This feature, when assigned to the co-located ADM, is accessed from the SL-1 set once the DATA SHIFT key is pressed on the ADM. If also assigned to the companion telephone, the feature will operate independently, i.e., activation will apply to either ADM (DATA SHIFT lamp steadily lit) or telephone (DATA SHIFT lamp dark).

Call Forward—internal calls

Description This feature adds greater flexibility to the Call Forward (CFW) All Calls feature, enabling a data station to opt to have *only* internal calls automatically forwarded to another data station within the customer group.

Feature operation and requirements adhere to the CFW All Calls feature. However, the forward DN for the Internal CFW feature functions independently of the forward DN for CFW All Calls. Consequently, non-internal calls are not affected by this new feature and will continue to be directed to the CFW DN defined for CFW All Calls.

Limitation The Internal CFW feature does not support data telephones. Therefore, on digital telephones that provide both voice and data communication, Internal CFW supports the voice line only.

Ring Again

Description This feature allows a station user to have the system monitor a busy directory number, and when it becomes free, to alert the calling station and to ring the called station. No digits are outpulsed until the alerted station accepts the call. The user may originate or receive other calls while Ring Again is activated.

Speed Call

Description Speed Calling allows a station user to place calls to a directory number by dialing a 1-, 2-, or 3-digit code. The DN may be for stations, CO trunks or DDD numbers.

Provision Speed call lists of 10, 100, or 1000 entries are assigned to a speed call controller who may use or change any entry in the list at any time. Any number of users may be assigned to any list.

Interaction Combined voice and data entries with the same Speed Call list are not recommended.

User Selectable Call Redirection

Description USCR allows the user to perform two tasks:

- Select the four redirection DNs from the telephone. These DNs include the CFNA DN and the external CFNA DN (if it exists).
- Change the way the number of ringing cycles is defined for Flexible Call Forward No Answer (CFNA). One of three options can now be selected from the telephone.

Limitation This feature does not support Basic Rate Interface (BRI) telephones.

Automatic Set Relocation

Description This feature allows the users to move the data sets to another location without the intervention of an installer. This feature is available with the QMT7 (ADM) and QMT11 (ASIM).

Automatic Route Selection

Description Automatic Route Selection (ARS) provides the system with the ability to complete outgoing calls using the cheapest and most efficient routing available.

Call Detail Recording

Description Call Detail Recording (CDR) is an SL-1 optional software package which provides a record of selected calls for accounting and administration purposes. The CDR call records include the identity of the calling and called parties plus the duration of the call. See *Call Detail Recording: Description and Formats* (553-2631-100) for a full description of this feature.

Interaction Data calls over outgoing trunks (via modem pool) are recorded as one outgoing trunk call (PDN to external data facility) transferred to a DN of a modem. If the same key is used for voice and data, then only one call type may be made at a time. Once a data call is established, then PDN is available to make a voice call.

Hunting—Computer Ports and Modem Pool (See Dataport Hunting)

Description Hunting allows a call directed to a busy DDN to be routed to the next idle DDN in a prearranged group. Of the four types of hunting provided by the Meridian SL-1 system, two types are recommended when used in conjunction with computer port DDN and Modem Pool DDN:

The hunting feature permits data users to access an idle device within a group of computer ports or modem pool ADM/modems by using the DDN.

Provision Hunting is assigned to a stand-alone ADM associated with computer ports or modem pool ADM/modems using LD 11. Data hunt groups must contain like members; i.e., there cannot be a mix of DDNs belonging to computer port ADM and Modem Pool ADM within a single hunt group.

Dataport Hunting

The Dataport Hunting (DPH) feature improves the hunting and ring again operations for modem pooling.

Before this feature was introduced, dataports were defined as stations in the software. To establish a pool of dataports, the stations were connected in a hunt chain. The maximum number of dataports which could be accessed under a single DN were limited by the maximum number of hunt steps for that software generic. If all members in the chain were busy, the calling party could only apply ring again against one station in the chain and might not be notified when the other dataports in the pool became idle.

The Dataport Hunting feature organizes the dataports into ADM trunk type routes and hunts the dataports as trunks.

A maximum of 128 dataports can be grouped under a single access code (with an option to step to another similar ADM route). If all members of a route are busy, the calling party may apply Ring Again and be notified when ever the first route number becomes idle.

A dataport is configured by connecting either

- a modem capable of auto answer to one unit of a 500 line card (QPC60) or
- a stand-alone ADM in the auto-answer mode to a data unit of a DLC (QPC311).

During day service only, an attendant can transfer incoming calls to dataport groups. During night service, any station can transfer calls to dataport groups.

Provision Modems and stand-alone ADM are assigned to the Dataport Hunting feature with Overlay Programs 16 and 14.

Digital Trunk Interface

DTI (X11 release 5 and later) provides for a trunk interface between a Meridian SL-1 Digital Network Loop and an external DS-1 Digital Carrier Termination.

This provides the capability of an all-digital path for voice and data transmission.

The DTI data channels support the same transmission mode, mode of operation, transmission speeds, and data format as the SADM.

The DTI feature may be used with AMP for Outbound Modem Pooling but is not used for Inbound Modem Pooling.

There are three different trunk types: Data Only, Voice and Data, and Voice Only. If a Data Only outgoing trunk is found, a modem is not necessary. However, a modem is inserted when either of the other two trunk types are used.

Provision LD 11 is used to designate the all-digital connection flag in the customer data block, while overlay programs 17, 73, 16, and 14 are used to establish the DTI feature. The prefix DN is defined in Overlay Program 16.

Computer/PBX Interface (CPI)

CPI provides a 24-channel T1 carrier link between the Meridian SL-1 and a host computer. CPI uses the DTI hardware connected to a host computer to provide data channels from the SL-1 to the host. CPI allows manufacturers to build the interface into their computers.

CPI eliminates the need for DLC, ADM, or MCDS and allows switched access to a large number of host computer ports (max 24 per CPI) via one interface.

CPI provides the capability of an all-digital path for data transmission to the host with the flexibility of supporting every asynchronous and synchronous protocol. (See *X11 Features and Services* (553-3001-306) for a full description of this feature).

The CPI data channels support the same transmission mode, mode of operation, transmission speeds, and data format as the SADM.

Remote Peripheral Equipment

Description Remote Peripheral Equipment (RPE) allows the range of the multiplexed loop between the common and peripheral equipment to be extended beyond 50 ft (15 m). The peripheral equipment may then be placed closer to the stations it serves and effectively increases the serving area of the Meridian 1.

Outbound Modem Pooling (not AMP)

Description This configuration allows non dedicated, dial-up access to voice-grade modems required for outgoing data calls to remote facilities over analog trunks.

Each pooled modem consists of an odd-numbered port on a DLC connected to a stand-alone ADM. The DLC port is assigned a DDN. The ADM is in turn connected to a voice-grade modem. The modem is connected to a Line Card (Modem Pool or regular) in the Meridian 1 PE.

> ***Note:*** With the AMP feature, the regular QPC60 line card is always used to establish a pooled modem. AMP in connection with the Dataport Hunting feature is able to determine the ringing requirements. There is also no need for the VFDN reference required with Manual Modem Pooling.

The MPLC supports up to four ADMs. An MPLC (QPC353) port is required for each asynchronous modem in an asynchronous modem pool. The MPLC is assigned a VFDN which corresponds to the VFDN switch setting in the ADM. This number is used to establish the outgoing call connection on the analog side (to analog trunk) of the modem.

A regular line card (QPC60) supports up to four synchronous modems in a synchronous outgoing modem pool.

To access the modem pool, a data station dials the DDN assigned to the ADM.

When a modem pool consists of more than one stand-alone ADM/modem pair, the hunting feature is used to provide users efficient modem pool access through use of one pilot modem pool DDN (see "Hunting—Computer Ports and Modem Pool (See Dataport Hunting)" on page 53).

The Ring Again queuing feature can also be applied by data callers who encounter a busy modem pool at the time of dialing (see "Ring Again" on page 52).

Provision The DDN and hunt group of the ADM/modem pair are entered in the office data using LD 11.

Declaration of the VFDN is made in the office data using Overlay Program 10.

The number of pooled modems to be supplied is determined according to customer utilization requirements, calculated by using *Meridian Data Features: Traffic Engineering and Configuration* (553-2731-151). Modem pools must be organized according to types and transmission modes (no mixing is allowed).

Limitations Data calls placed through the modem pool over unconditioned voice-grade lines are limited to a maximum transmission rate determined by the modem capability or by the limitations of the unconditioned line.

Inbound Modem Pooling

Description This feature is only applicable to the QMT8 and higher numbered ADM.

Each pooled modem consists of a QPC60 connected to a modem. The modem is in turn connected to a stand-alone ADM. The ADM is connected to a DLC in the SL-1 PE.

An inbound modem pool is a group of modems configured in a pool to permit remote terminals to access local computer ports (or terminals) over a voice-grade network. Both asynchronous and synchronous modems are supported for access to single hosts. However, only asynchronous modems are supported for access to multiple hosts. The Inbound Modem Pool is separate from the Outbound Modem Pool. The dialing procedures are different for access to a single host (via Hotline) versus access to multiple hosts.

> ***Note:*** With AMP there is no need to separate the inbound from the outbound pool.

Provision The DDN and hunt group of the ADM/modem pair are entered in the office data using LD 11. A 500-telephone line card is required to establish the incoming call connection on the analog side (to analog trunk). The number of pooled modems to be supplied is determined according to customer utilization requirements, calculated by using *Meridian Data Features: Traffic Engineering and Configuration* (553-2731-151). Modem pools must be organized according to modem types, i.e., modems of the same speeds and modulation shall be placed in the same pool.

Interaction Assign the analog DN of the modems into the hunt group. (The analog DN is the number assigned to the line card that is connected to the analog end of the modem.) It is possible to configure the inbound modem pool with Ring Again; however, this is not recommended due to the possibility of tying up trunks and time slots.

Dedicated modems

Description This configuration allows dial-up or Hotline access to a voice-grade dedicated facility for outgoing data calls. Each dedicated modem is connected to a stand-alone ADM which is connected to an odd-numbered port on a DLC in a peripheral equipment shelf. The DLC is assigned a DDN which any data station, equipped with an SL-1 set/ADM pair, can dial up for first-come first-served modem access.

The Ring Again queuing feature can also be applied by data callers who encounter a busy modem pool at the time of dialing (see "Ring Again" on page 52).

Provision The DDN of the ADM/modem pair is entered in the office data using LD 11.

Limitations When an unconditioned voice-grade line facility is used, a data call placed through the modem is limited to a maximum transmission rate as determined by the modem capability or by the limitations of the unconditioned line.

Automated Modem Pooling

Description This feature is only applicable when QMT8 (vintage D11) and higher numbered SADM are used to form the ADM/Modem pair.

With AMP, available as an option in X11 release 5, the ADM/Modem pair information is organized in pool lists that contain similar modems, for speed and other options, to be accessed for use with compatible dataports.

AMP allows access to local and remote data stations using ADM/Modem pairs by a one-step dialing procedure. It is dependent upon the ADM trunk group hunting feature in its selection of modems and dataports.

AMP is able to distinguish between inbound and outbound ringing requirements. Therefore a special MPLC and separate outbound and inbound pools are no longer required.

With AMP, the service changes to pair the ADM and modem together eliminates the VFDN switch and the AUTO DIAL simulation requirements.

Outbound AMP

The Outbound AMP application replaces the manual three-step method of accessing modems with a one-step dialing procedure. Two different dialing procedures are available:

- Prefix dialing method
- Default method

With the Prefix dialing method, the user dials a Modem Selection Prefix of 1 to 4 digits, a trunk access code that is used to route the call and the remote computer DN.

With the default method, it is assumed that the data user normally wishes to connect to the same modem pool for every call. In this case the Modem Selection Prefix is stored against the user's TN and the user only needs to dial the trunk access code and the remote computer DN.

A user may use either method to automatically access and connect the modem. The stored Default Modem Selection Prefix can always be overridden by dialing another Modem Selection Prefix.

If the DTI package is equipped and an all-digital path to the remote computer is available, an All-Digital Connection Prefix can be designated in the Customer Data Block. If this special prefix is used with the Prefix or Default method, a modem is not connected when the outgoing route is digital.

Inbound AMP

The Inbound AMP allows an incoming data call (via DID/Tie trunks) to terminate to a computer port or a data set. If the incoming call is voice frequency and the data port is not analog, an ADM/Modem pair is switched into the connection. If the incoming call is a digital data call, the connection to the computer port is completed without searching for a modem.

Provision When ADMs are used as dataports, they are configured to look like trunk members in an ADM trunk block.

When ADMs are used as data sets, they are configured as SL-1 sets in the TN block. A prompt "DTYP" is used to specify inbound only, outbound only, or combined inbound/outbound.

Keyboard dialing

Description This feature allows Data Terminal Equipment (DTE) to initiate and/or terminate data calls to in-house or remote hosts using the terminal keyboard without the use of a telephone.

Keyboard dialing capability is provided on asynchronous terminals connected to

- co-located asynchronous QMT8
- QMT9 (AIM)
- QMT11 (ASIM)

Provision This feature is supported for ASCII, asynchronous, character mode, interactive terminals equipped with EIA and RS-232-C interface. It is not provided for synchronous or block mode terminals.

Keypad dialing

Description This feature allows the ASIM to initiate and/or terminate asynchronous or synchronous data calls to in-house or remote hosts using the ASIM keypad.

Provision Keypad dialing capability is provided on ASIM terminals with a standard 12-button dial pad that has the digits 0 through 9, plus the * and the #.

Synchronous Data Switching

Description This capability allows synchronous terminals to have switched access to local and remote computers equipped with synchronous ports.

Interaction This feature is supported by the synchronous QMT8, QMT12, ADM, and ASIM.

Hotline

Description This feature is used when a data user always wants to access a particular data station.

Hotline from QMT8 This feature is used with keyboard dialing and is similar to and uses the Automatic Dialing software. Hotline is accessed from the data terminal by

- turning DTE on
- switching DTE from off-line to on-line
- operating the carriage return (CR) key

Hotline from QMT11 If the ASIM and the hotline key are ON, the feature is activated by

- turning the DTE on
- releasing a call and entering a carriage return command
- momentarily depowering the ASIM when the DTE is on

Hotline uses the assigned AUTO-DIAL key.

At a co-located data station, the data DN may be assigned Hotline, while the voice DN may be assigned AUTO-DIAL.

Provision Use LD 11 to assign the feature to an ASIM or a co-located or a stand-alone ADM. It is assigned as ADL in the overlay and to key/lamp pair number three. The ADM or ASIM must be configured for Hotline.

Transparent Data Networking

Description This feature provides a transparent data channel for data modules to perform end-to-end protocol exchange. This means that two data modules will wait for a circuit path to be established before exchanging protocol parameters. The data modules and protocols that are supported by TDN are

- Meridian Communications Adapter (MCA) card in a Meridian Modular telephone (MMT) set. Uses PSDS and T-Link protocols on external calls.
- Meridian Communications Unit (MCU), a stand-alone unit. Uses PSDS and T-Link protocols on external calls.
- Basic Rate Interface (BRI) telephones. Use T-Link, V.110, and V.120 protocols.
- High Speed Data Module (HSDM). When configured to use PSDS.

In X11 release 19, there are three ways to provide a transparent data channel to accommodate data calls from modules using the above end-to-end protocols:

- ESN19 signaling on the private network
- STD signaling on the private network with the STDN option (Standard Signaling TYPE [STYP]=STDN)
- TDN only routes for access to the public network or other vendor PBXs

The TDN feature is an important development for MMT, BRI, and HSDM telephones that use PSDS, T-Link, and other non-proprietary protocols or rate adaption schemes, as it allows calls to be tandemed across a private network before terminating on to a public network. This enables private network users to take maximum advantage of their own network facilities before entering the public network.

> ***Note:*** A network with all PRI trunks using release 19 or greater has data tandeming capabilities without using ESN19 signaling or TDN routes.

Feature Requirements The TDN feature requires the following:

- QPC720 card in either DTI or PRI mode
- PRI trunks must use either TDN routes or ESN19

Limitations Point-to-point protocols, such as DM-DM, an NT proprietary protocol, are not supported by TDN. Refer to the feature description for a list of data modules and protocols that are supported by TDN.

Refer to *Transparent Data Networking* (553-2731-110) for detailed information on this feature.

Meridian Communications Unit

Description The Meridian Communications Unit (MCU) allows you to transmit and receive data using either PSDS over the public network or a private network. The MCU, which replaces the QMT21C, is designed for domestic and international use, with transmission speeds up to 19.2 Kbps asynch and 64 Kbps synch, integrated display, and self-diagnostics. The MCU supports Autodialing, Ring Again, and Speed Calling, as well as autobauding and automatic parity detection. You can use the MCU for

- Video conferencing
- LAN bridging
- Bulk data/PC file transfer
- Dial back-up
- Host connectivity

The MCU fully complies with RS-232-C and can be configured as DCE or DTE to connect to a terminal, printer, or fax machine.

Unlike the MCA, the MCU provides a dedicated call key and call progress tones. The MCU also permits smart modem pooling.

The MCU supports the DM-DM, T-Link, V.25 bis, and PSDS interfaces, as well as the RS-232-C, CCITT V.35, CCITT V.24, and RS570/RS3449 (with different cables) interfaces. It complies with V.28 for European approval.

Refer to *Meridian Communications Unit and Meridian Communications Adapter: Description, Installation, Administration, Operation* (553-2731-109) for detailed information on this feature.

Implementation

Content list

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Reference list

The following are the references in this section:

- *Meridian Data Features: Traffic Engineering and Configuration* (553-2731-151)
- *Traffic Measurement: Formats and Output* (553-2001-450)
- *Meridian Data Features: Operations and Tests* (553-2731-300)

Allowable operating distances

An ADM, MCDS, AIM, or ASIM may be placed as far from its associated data terminal as is consistent with EIA RS-232 lead specifications. This separation distance is not absorbed in the following information.

Single wire gauge

The allowable operating distances between the SL-1 peripheral equipment (DLC) and a data terminal/computer port or MCDS port when one wire gauge is used are as follows:

Cable	PIC outside	PVC inside (Type D)
22 AWG	4000 ft (1219 m)	4000 ft (1219 m [1] 3400 ft (1036 m) [2]
24 AWG	3500 ft (1067 m)	2900 ft (884 m) [1] 2000 ft (610 m) [2] 1600 ft (488 m) [3]
26 AWG	200 ft (610 m)	2000 ft (610 m) [1] 1700 ft (518 m) [2]

Note 1: QPC311E or higher vintage with QMT7C/D, QMT8A, QMT12A, MCDS

Note 2: QPC311C/D with QMT7C/D, QMT8A, QMT12A, MCDS

Note 3: QMT7D operating limitation with Nortel Networks cable

Note 1: A co-located ADM may be installed up to 4000 ft (1200 m) from the DLC. This allows an end to end separation of 8000 ft (2400 m).

Note 2: In some instances, the above limitations may be exceeded with no adverse effect upon ADM, AIM, or MCDS operation.

Mixed wire gauge

In a mixed wire gauge application, the allowable equipment separation distance must be reduced in order to retain transmission quality. Average figures are as follows:

Cable	PIC outside	PVC inside (Type D)
22/24 AWG	2500 ft (762 m)	2500 ft (762 m)[1] 2100 ft (640 m) [2]
24/26AWG	1500 ft (457 m)	1500 ft (457 m)[1] 1200 ft (366 m) [2]
Note 1: QPC311E or higher vintage with QMT7C/D, QMT8A, QMT12A, MCDS ***Note 2:*** QPC311C/D with QMT7C/D, QMT8A, QMT12A, MCDS ***Note 3:*** QMT7D operating limitation with Nortel Networks cable		

Note 1: A co-located ADM may be installed up to 4000 ft (1200 m) from the DLC. This allows an end to end separation of 8000 ft (2400 m).

Note 2: In some instances, the above limitations may be exceeded with no adverse effect upon ADM, AIM, or MCDS operation.

AIM

An AIM may be placed as far from its associated AILC port as is consistent with EIA RS-422 lead specifications, which limits the distance to 4000 ft (1200 m).

Customers who use RPE can install ADM at remote locations as well as at the main location. This extends the range of all-digital data communications to approximately 100 km.

Cable specifications

Twisted wire pairs must be used for digital pairs, and no bridge taps are allowed. The crosstalk figure of cable used between the MDF and ADM measured at 64 kHz with 100 ohm termination must be

- near end crosstalk > 40 dB
- far end crosstalk > 40 dB

Strapping options are provided on the DLC and ADM for the selection of wire gauges applicable to the installation.

Modem pool configuration

The modem pool configuration provides internal data station access to shared dial-up modems for outgoing trunk calls and remote terminal access to local computer ports over a voice-grade network. The inbound modem pool is separate from the outbound modem pool. An ADM connected to the modem provides the DDN required for the receipt of incoming calls to the pooled modem.

> ***Note:*** With AMP it is no longer necessary to maintain separate inbound and outbound modem pools.

The number of modems within a modem pool is determined according to traffic requirements for that modem pool (see *Meridian Data Features: Traffic Engineering and Configuration* (553-2731-151)), and several modem pools may be configured as required to meet the customer's application requirements.

Hardware requirements

This section describes the primary equipment items, excluding the SL-1 switch itself, required to implement the Meridian Data Services feature.

One ADM, or AIM, or ASIM, or MCDS-AC is required to interface with each data device supplied by the customer.

ADM

In the co-located mode, the ADM operates in conjunction with an SL-1 telephone to provide the interface with data terminal equipment in cases where

- both voice and data calling are required
- answer-and-originate data calling capabilities are required

In stand-alone mode (no companion SL-1 telephone), the ADM supports incoming data calls where no voice calling or data-call originating capabilities are required (for example, computer ports and modems).

AIM

The AIM and its associated AILC port supports all types of outgoing and incoming data calls where no voice calling or data-call originating capabilities are required (for example, computer ports and modems).

ASIM

The ASIM supports all types of asynchronous and synchronous outgoing and incoming data calls. Either keyboard or keypad dialing is used to establish the asynchronous outgoing connections while only keypad dialing may be used to establish synchronous outgoing connection.

Power supply

Power for each module is supplied externally as follows:

- One external power unit is required to provide local 24 V input to each ADM or AIM. A 110 or 220 V ac to 24 V transformer must be used. Use a P0593922 or P0610756 24 V transformer for the ADM. The A0290050 24 V transformer is recommended for use with the AIM.
- One external power supply (A0297998) is required for each ASIM. A 110 V ac input service should be used. An optional 220 V power supply (A0318291) is available for the international market. The ASIM power supplies are assembled with the units and it is not necessary to order them separately.

DLC

The QPC311 DLC supports SL-1 sets, ADM and ASIM in the following operating combinations:

- two independent telephone and two stand-alone ADMs
- two co-located telephone/ADM pairs
- one co-located telephone/ADM pair plus one independent SL-1 set and one stand-alone ADM
- two ASIM plus two SL-1 sets

The QPC432 4PDLC supports four ASIM or four ports of MCDS-AC.

AILC

The QPC430 AILC supports four AIM or equivalent units. It combines the basic functions of four ADM and provides the drivers and receivers to meet standard EIA RS-422 electrical interface specifications.

Modem Pool Line Card (asynchronous outbound only)

Each customer-supplied asynchronous outbound pooled modem requires interface, on the analog side, with one port of an MPLC. This provides the modem VFDN. One MPLC supports up to four modem pool VFDN. (The MPLC cannot be used for 500 or 2500 type set terminations.) The 500-set line card is used for inbound modem pools and for synchronous modem pools.

Note: The MPLC and the VFDN are not used with the AMP feature.

Multi-Channel Data System

The MCDS-AC port may be used instead of ADM to interface multiple ports of a computer. An MCDS-AC port is required to interface each computer port to the equipment using a DLC.

Major equipment items required to implement MCDS consist of

- MCDS shelf
- DLC
- MCDS-AC
- MCDS power supply unit
- MCDS cabinet (optional)
- Spectron patch panel and cables (optional)

MCDS cabinet

Two different enclosures are available:

- A large cabinet (varying sizes and configurations) that can accommodate two shelves and four patch panels
- A smaller cabinet that accommodates one shelf only

MCDS shelf

The MCDS shelf houses a center-mounted power supply and four asynchronous cards mounted on each side of the power supply (a total of eight). It can be either a stand-alone unit on an equipment frame or mount in the MCDS cabinet.

MCDS power supply

The MCDS power supply is an off-line, switched mode supply which provides multiple, regulated, and protected DC voltage to the shelf backplane. It requires 1.7 amp from a 120 V, 60 Hz ac source. It supplies steady-state 140 watts multiple, regulated, and protected DC voltage to the backplane. An optional MCDS power supply is available that connects to 220 V, 50 Hz ac lines.

MCDS backplane

The MCDS backplane, which is part of the shelf assembly, is provided with two-sided circuitry. It is equipped with nine 160-pin connectors to receive the interface and power supply circuit packs. It is also equipped with two 25-pair standard telecom-type plugs to connect to the SL-1 switch and 32 female-type, standard 25-pin, RS-232-C connectors to provide interface to the computer ports. The backplane is also provided with an insulator sheet on the rear surface to prevent accidental shorting of the traces with metal connector hoods.

MCDS-AC

The MCDS-AC provides the drivers and receivers to meet the EIA standard RS-232-C electrical interface specifications.

Traffic measurements

Traffic measurements provided for data traffic and feature usage for data calls are the same as for voice traffic from telephones. Refer to *Traffic Measurement: Formats and Output* (553-2001-450) for further information on available traffic measurement.

Memory and real time requirements

Implementation of the SL-1 data feature requires additional memory for each ADM added. Requirements for unprotected and protected data store and real time are given in *Meridian Data Features: Traffic Engineering and Configuration* (553-2731-151).

Maintenance and testing

A manual remote loopback testing capability is provided for isolating ADM and ASIM faults. Information on remote loopback testing procedures is given in *Meridian Data Features: Operations and Tests* (553-2731-300).

All resident maintenance programs, maintenance overlays, and diagnostics which apply to telephones and line cards are also applicable to the ADM, AIM, ASIM, and AC ports, DLC, AILC, and MPLC.

Administration

The Meridian 1 recognizes the ADM, AIM, ASIM, or MCDS-AC port as a telephone; the DLC, 4PDLC, or AILC as an SL-1 line card; and the MPLC as a 500-type line card. LD 10 and LD 11 are used to enter the parameters for data hardware in the SL-1's office memory.

ADM/ASIM	LD 11
MCDS-AC	LD 11
DLC/4PDLC	LD 11
AILC	LD 11
MPLC	LD 10
VFDN	LD 10

The optional AMP and associated features require modifications to the following programs to enter data into memory.

AMP	LD 16
Dataport Hunting and Modem TN	LD 14
DTI Default Flag	LD 11
DTI Default Prefix	LD 15

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Meridian 1

Meridian Data Services

Description

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